MONTECH®

USER MANUAL

Handling Components
Compact Universal Slide
KUS

BA-100029

ENGLISH

Edition: 02/2006

Change index

Previously published editions:

Edition	Remark	Article number
08/2004	First edition	508435
02/2006		BA-100029

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1 Important information

1.1 Introduction

This User Manual describes the mechanical design, the technical data, the load limits, the installation, the maintenance and the spare parts of the compact universal slide KUS.

1.2 Declaration of EU conformance (to Directive on Machines, Appendix II A)

Regulations and standards taken into account:

- Directive on Machines 89/392/EEC, 91/368/EEC

Manufacturer:

Montech AG
Gewerbestrasse 12 Tel. +41 (0) 32 681 55 00
CH-4552 Derendingen Fax +41 (0) 32 682 19 77

1.3 Product description and application

Compact universal slides KUS are pneumatically operated linear units for performing regular, linear forward and backward movements in any direction in space.

The load limits which were specified by the technical data for each slide size must be complied with under all circumstances. Overloading can lead to faults and failure of the devices.

1.4 Dangers

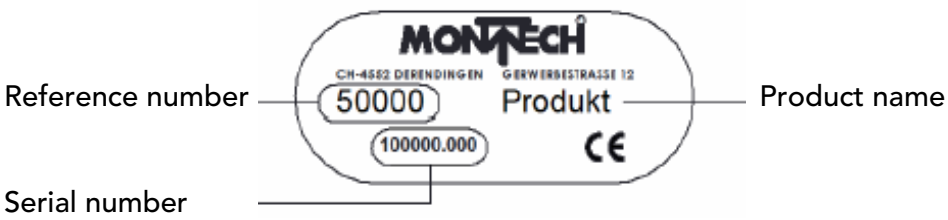
The use of compact universal slides KUS in equipment is permissible only when they provide protection by **movable, separating protective devices according to EN 292-2 Section 4.2.2.3**. Failure to observe this safety measure can result in injuries due to crushing and impact, particularly in the case of machines which start up automatically.
The stated load limits must be complied with.

Important!
During work on the device, it must be ensured that the compressed air cannot be switched on by unauthorized persons!

1.5 Additional information

The aim of the present User Manual is to enable users to employ compact universal slide KUS correctly and safely. Should further information be required in relation to your particular application, please contact the manufacturer.
When reordering User Manuals, it is essential to quote the reference number, the product name and serial number.
This document can be obtained from our homepage www.montech.com.

Fig. 1.5-1: Nameplate



Montech AG
Management

U. D. Wagner

C. Wullschleger

1.6 Validity of the User Manual

Our products are continually updated to reflect the latest state of the art and practical experience. In line with product developments, our User Manuals are continually updated.
Every User Manual has an order number (e.g. BA-100029) and an edition number (e.g. 02/2006). The order number and the addition number are shown on the title page.

2 Technical data

2.1 Technical data for KUS-16-..-SD

			KUS-16-20-SD	KUS-16-40-SD	KUS-16-60-SD	KUS-16-80-SD
Stroke (min. / max.)		[mm]	5 / 20	5 / 40	20 / 60	40 / 80
Adjustment range of stops (per side)		[mm]	20	20	20	20
Piston Ø		[mm]	16	16	16	16
Piston rod Ø		[mm]	6	6	6	6
Perm. mounting mass horiz. m_{hmax}		[kg]	4	4	4	4
Perm. mounting mass vert. m_{vmax}	1)	[kg]	3	3	3	3
Max. stat. moment M_{0xmax}	2)	[Nm]	15	18	21	24
Max. stat. moment M_{0ymax}	2)	[Nm]	9	12	15	18
Max. stat. moment M_{0zmax}	2)	[Nm]	9	12	15	18
Max. stat. force F_{xmax} (at 5 bar)	2)	[N]	60	60	60	60
Max. stat. force F_{ymax}	2)	[N]	120	130	140	150
Max. stat. force F_{zmax}	2)	[N]	120	130	140	150
Unloaded weight		[kg]	0.75	0.85	0.95	1.05
Operating pressure		[bar]	3 - 6			
Drive medium			Oiled or unoiled air filtered to 5 µm, dew point < 6°C			
End position damping			Hydraulic shock absorbers			
Repeatability	3)	[mm]	< 0.01			
End position monitoring	4)		Inductive proximity switches			
Pneumatic connection			Hose ø 4mm			
Speed regulation			Adjustable exhaust throttle valves			
Sound level	5)	[dBA]	< 64			
Environment: Temperature		[°C]	10 ... 50			
Rel. humidity			< 95% (non-condensing)			
Air purity			Normal workshop atomsphere			
Warranty			2 years from the date of delivery			
Installation position	1)		Arbitrary			
Material			Aluminum, steel			

1) For vertical applications, use compensating spring (see Special accessories: compensating spring kits)
2) See load calculations
3) Variation of the end position with 100 successive strokes, conditions as for 5)
4) See Accessories
5) Measured at 5 bar, maximum horizontal stroke, with m=m_{hmax}, throttled (travel to end positions without impact)

2.2 Technical data for KUS-20-...-SD

			KUS-20-40-SD	KUS-20-80-SD	KUS-20-120-SD	KUS-20-160-SD
Stroke (min. / max.)		[mm]	10 / 40	10 / 80	40 / 120	80 / 160
Adjustment range of stops (per side)		[mm]	40	40	40	40
Piston Ø		[mm]	20	20	20	20
Piston rod Ø		[mm]	8	8	8	8
Perm. mounting mass horiz. m_{hmax}		[kg]	6	6	6	6
Perm. mounting mass vert. m_{vmax}	1)	[kg]	5	5	5	5
Max. stat. moment M_{0xmax}	2)	[Nm]	22	27	32	37
Max. stat. moment M_{0ymax}	2)	[Nm]	18	26	34	42
Max. stat. moment M_{0zmax}	2)	[Nm]	18	26	34	42
Max. stat. force F_{xmax} (at 5 bar)	2)	[N]	90	90	90	90
Max. stat. force F_{ymax}	2)	[N]	180	210	240	270
Max. stat. force F_{zmax}	2)	[N]	180	210	240	270
Unloaded weight		[kg]	1.3	1.6	1.9	2.2
Operating pressure		[bar]	3 - 6			
Drive medium			Oiled or unoiled air filtered to 5 µm, dew point < 6°C			
End position damping			Hydraulic shock absorbers			
Repeatability	3)	[mm]	< 0.01			
End position monitoring	4)		Inductive proximity switches			
Pneumatic connection			Hose ø 6mm			
Speed regulation			Adjustable exhaust throttle valves			
Sound level	5)	[dBA]	< 64			
Environment: Temperature		[°C]	10 ... 50			
Rel. humidity			< 95% (non-condensing)			
Air purity			Normal workshop atmosphere			
Warranty			2 years from the date of delivery			
Installation position	1)		Arbitrary			
Material			Aluminum, steel			

1) For vertical applications, use compensating spring (see Special accessories: compensating spring kits)
2) See load calculations
3) Variation of the end position with 100 successive strokes, conditions as for 5)
4) See Accessories
5) Measured at 5 bar, maximum horizontal stroke, with $m=m_{hmax}$, throttled (travel to end positions without impact)

2.3 Technical data for KUS-25-...-SD

			KUS-25-60-SD	KUS-25-120-SD	KUS-25-180-SD	KUS-25-240-SD
Stroke (min. / max.)		[mm]	10 / 60	40 / 120	100 / 180	160 / 240
Adjustment range of stops (per side)		[mm]	40	40	40	40
Piston Ø		[mm]	25	25	25	25
Piston rod Ø		[mm]	10	10	10	10
Perm. mounting mass horiz. m_{hmax}		[kg]	6	10	10	10
Perm. mounting mass vert. m_{vmax}	1)	[kg]	8	8	8	8
Max. stat. moment M_{0xmax}	2)	[Nm]	50	62	74	86
Max. stat. moment M_{0ymax}	2)	[Nm]	44	66	88	110
Max. stat. moment M_{0zmax}	2)	[Nm]	44	66	88	110
Max. stat. force F_{xmax} (at 5 bar)	2)	[N]	150	150	150	150
Max. stat. force F_{ymax}	2)	[N]	300	360	420	480
Max. stat. force F_{zmax}	2)	[N]	300	360	420	480
Unloaded weight		[kg]	2.4	3.1	3.8	4.5
Operating pressure		[bar]	3 - 6			
Drive medium			Oiled or unoiled air filtered to 5 µm, dew point < 6°C			
End position damping			Hydraulic shock absorbers			
Repeatability	3)	[mm]	< 0.01			
End position monitoring	4)		Inductive proximity switches			
Pneumatic connection			Hose ø 6mm			
Speed regulation			Adjustable exhaust throttle valves			
Sound level	5)	[dBA]	< 64			
Environment: Temperature		[°C]	10 ... 50			
Rel. humidity			< 95% (non-condensing)			
Air purity			Normal workshop atmosphere			
Warranty			2 years from the date of delivery			
Installation position	1)		Arbitrary			
Material			Aluminum, steel			

1) For vertical applications, use compensating spring (see Special accessories: compensating spring kits)
2) See load calculations
3) Variation of the end position with 100 successive strokes, conditions as for 5)
4) See Accessories
5) Measured at 5 bar, maximum horizontal stroke, with $m=m_{hmax}$, throttled (travel to end positions without impact)

2.4 Special accessories

Compensating spring kits:

Tension spring with clamping pin and 2 hexagon nuts for installation for vertical use:

Designation	Article No.
Compensating spring kit for KUS-16-20-SD	**51631**
Compensating spring kit for KUS-16-40-SD	**51632**
Compensating spring kit for KUS-16-60-SD	**51633**
Compensating spring kit for KUS-16-80-SD	**51634**
Compensating spring kit for KUS-20-40-SD	**51635**
Compensating spring kit for KUS-20-80-SD	**51636**
Compensating spring kit for KUS-20-120-SD	**51637**
Compensating spring kit for KUS-20-160-SD	**51638**
Compensating spring kit for KUS-25-60-SD	**51639**
Compensating spring kit for KUS-25-120-SD	**51640**
Compensating spring kit for KUS-25-180-SD	**51641**
Compensating spring kit for KUS-25-240-SD	**51642**

2.5 Accessories

Inductive proximity switches:

PNP ø 6.5 mm with LED, short-circuit-proof and with pole reversal protection, sensing distance 2 mm, can be installed flush:

Designation	Article No.
Cable length 2.5 m	**504513**
Cable length 5 m	**504755**
Pluggable	**508449**

Connecting cable for pluggable proximity switches:

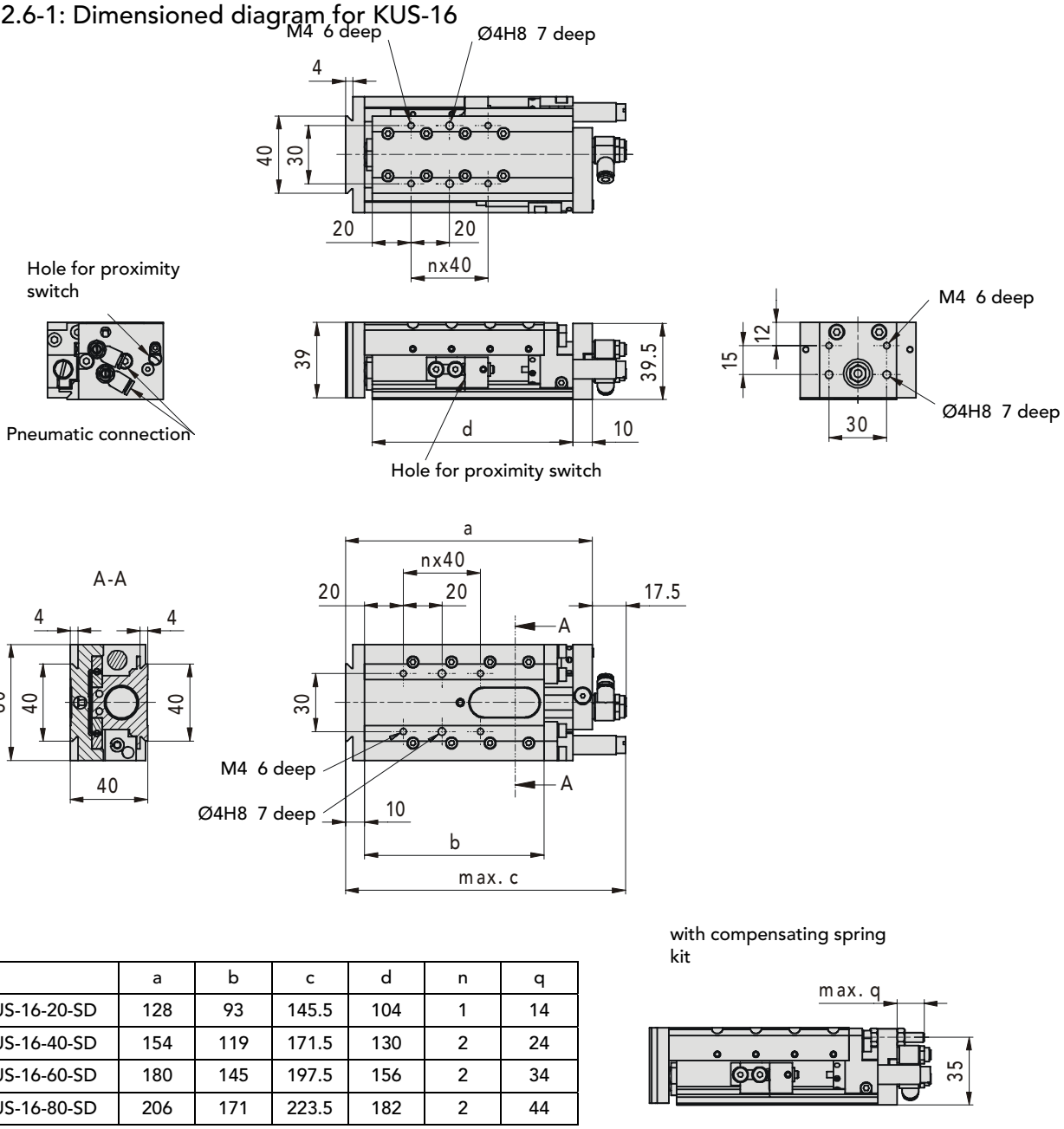
For 3-pole proximity switch, highly flexible, screwable M8x1:

Designation	Aritcle No.
Cable length 1 m, with socket angled on one side	**506488**
Cable length 5 m, with socket angled on one side	**504929**
Cable length 10 m, with socket angled on one side	**507529**

2.6 Dimensioned diagrams

2.6.1 KUS-16

Fig. 2.6-1: Dimensioned diagram for KUS-16



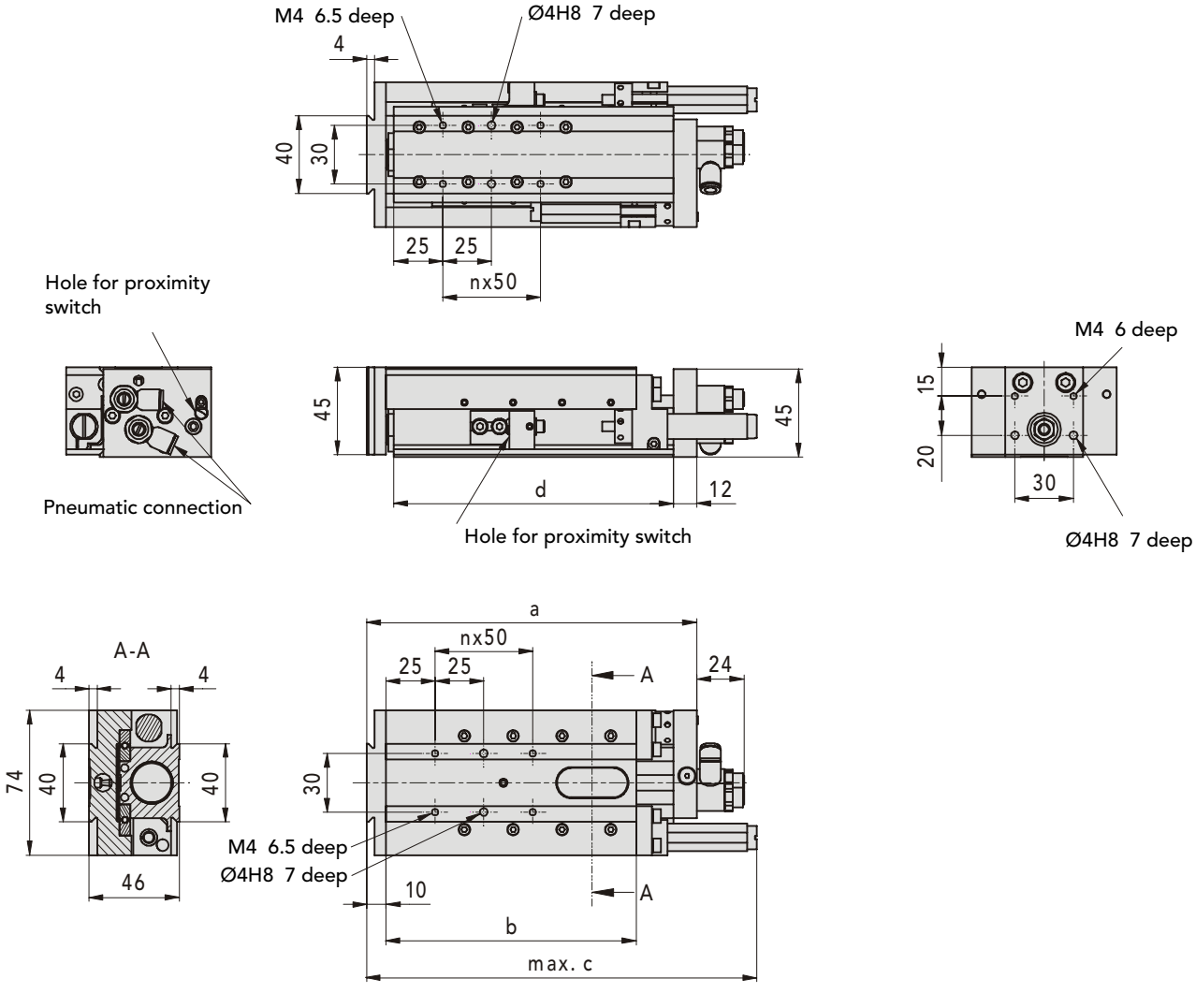
	a	b	c	d	n	q
KUS-16-20-SD	128	93	145.5	104	1	14
KUS-16-40-SD	154	119	171.5	130	2	24
KUS-16-60-SD	180	145	197.5	156	2	34
KUS-16-80-SD	206	171	223.5	182	2	44

with compensating spring kit

Designation	Article No.
KUS-16-20-SD	51540
KUS-16-40-SD	51541
KUS-16-60-SD	51542
KUS-16-80-SD	51543

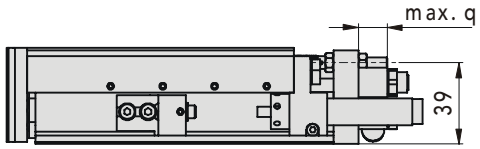
2.6.2 KUS-20

Fig. 2.6-2: Dimensioned diagram for KUS-20



	a	b	c	d	n	q
KUS-20-40-SD	169	128	200	143	1	14
KUS-20-80-SD	221	180	252	195	2	24
KUS-20-120-SD	273	232	304	247	3	34
KUS-20-160-SD	325	284	356	299	3	44

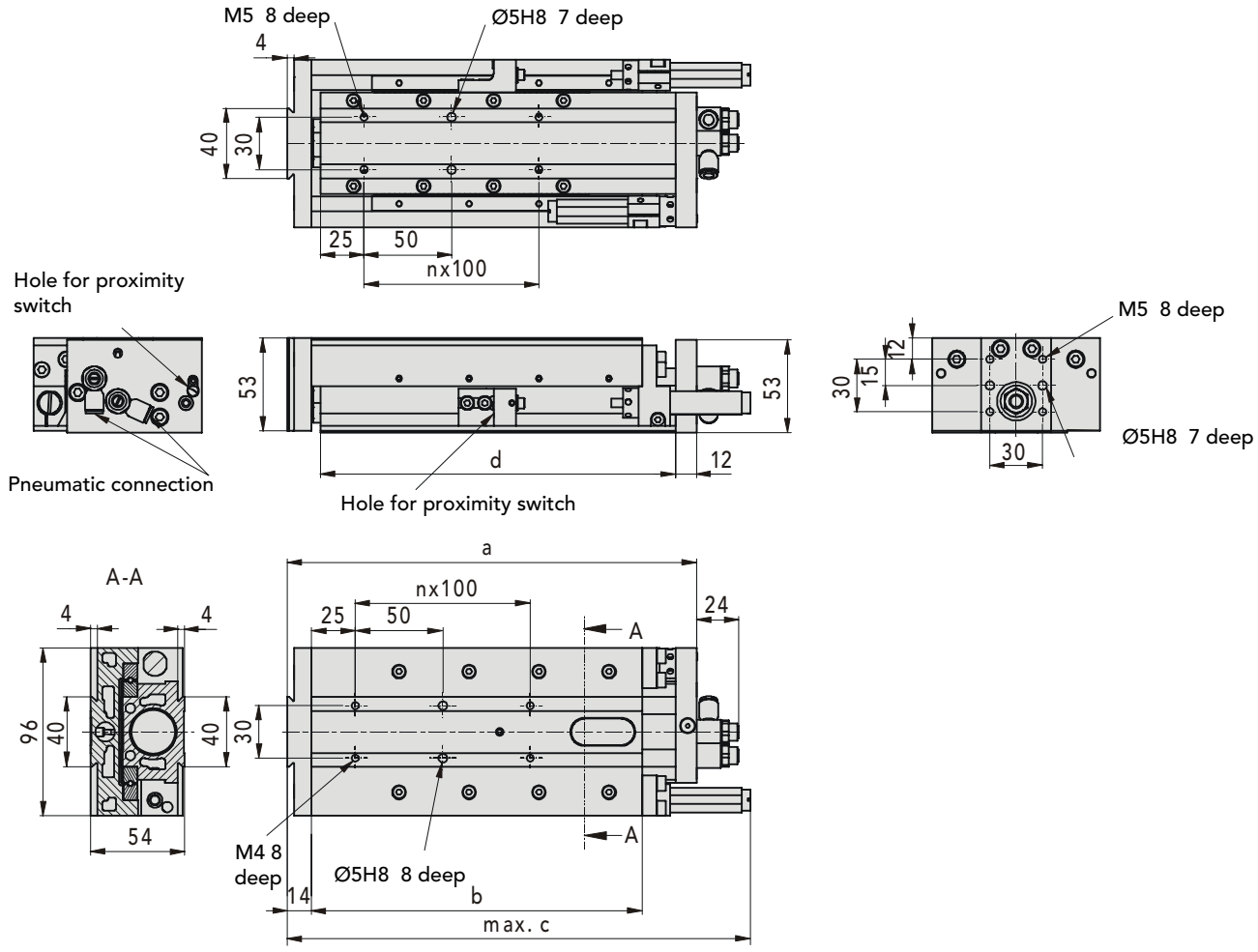
with compensating spring kit



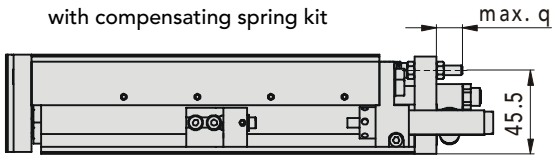
Designation	Article No.
KUS-20-40-SD	51544
KUS-20-80-SD	51545
KUS-20-120-SD	51546
KUS-20-160-SD	51547

2.6.3 KUS-25

Fig. 2.6-3: Dimensioned diagram for KUS-25



	a	b	c	d	n	q
KUS-25-60-SD	234	189	265	203	1	14
KUS-25-120-SD	318	273	349	287	2	24
KUS-25-180-SD	402	357	433	371	2	34
KUS-25-240-SD	484	439	515	453	3	44

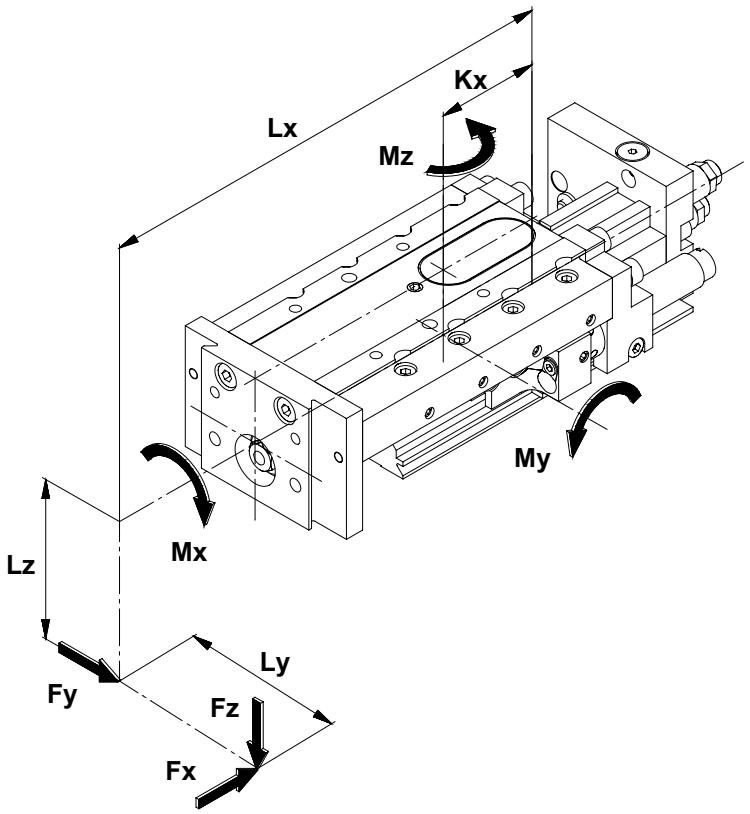


Designation	Article No.
KUS-25-60-SD	51548
KUS-25-120-SD	51549
KUS-25-180-SD	51550
KUS-25-240-SD	51551

2.7 Load calculations

The load values stated in the technical data are maximum values in the case of a single load. The following calculations apply to the combined loads experienced in practical applications:

Fig. 2.7-1: Load calculations



a) Dynamic load with horizontal use

$$M_X = 0.001 \cdot m \cdot g \cdot L_Y$$
$$M_Y = 0.001 \cdot m \cdot (g \cdot (L_X - K_X) + 25 \cdot L_Z)$$
$$M_Z = 0.001 \cdot m \cdot 25 \cdot L_Y$$

Combined dynamic load with horizontal use:

$$B = \frac{M_Y}{M_{Y\max}} + \frac{M_X + M_Z}{(M_X + M_Z)_{\max}} \leq 1$$

b) Dynamic load with vertical use

$$M_Y = 0.001 \cdot m \cdot (g + 25) \cdot L_Z$$
$$M_Z = 0.001 \cdot m \cdot (g + 25) \cdot L_Y$$

Combined dynamic load with vertical use:

$$B = \frac{M_Y}{M_{Y\max}} + \frac{M_Z}{M_{Z\max}} \leq 1$$

c) Static load

$$M_{0X} = 0.001 \cdot (F_Y \cdot L_Z + F_Z \cdot L_Y)$$
$$M_{0Y} = 0.001 \cdot (F_X \cdot L_Z + F_Z \cdot (L_X - K_X))$$
$$M_{0Z} = 0.001 \cdot (F_X \cdot L_Y + F_Y \cdot (L_X - K_X))$$

Combined static load: $$B_0 = \frac{M_{0X}}{M_{0Xmax}} + \frac{M_{0Y}}{M_{0Ymax}} + \frac{M_{0Z}}{M_{0Zmax}} \leq 1$$

B, B_0	Load factor: **Must not exceed the value 1**!
M_i, M_{0i}	Existing moments [Nm]
M_{imax}, M_{0imax}	Max. permissible moments [Nm] (see table)
m	Mounting mass [kg]
Lx, Ly, Lz	Distance of center of gravity of the moving mass or force application distances [mm]
Fx, Fy, Fz	Active forces [N], for max. values, see "Technical data"
Kx	Constant according to table [mm]
g	Acceleration due to gravity (9.81 m/s²)

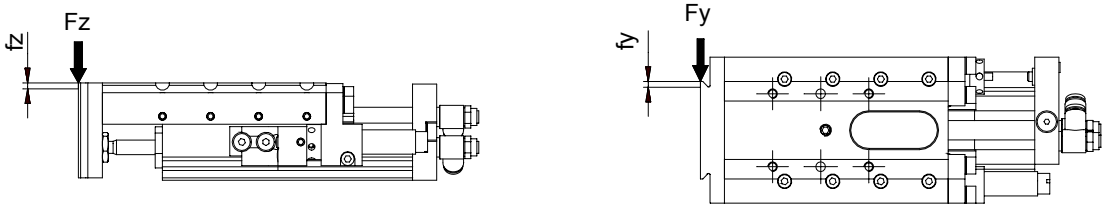
		Horizontal use		Vertical use		Static		
	Kx [mm]	**M_{Ymax}** [Nm]	**$(M_X+M_Z)_{max}$** [Nm]	**M_{Ymax}** [Nm]	**M_{Zmax}** [Nm]	**M_{0Xmax}** [Nm]	**M_{0Ymax}** [Nm]	**M_{0Zmax}** [Nm]
KUS-16-20-SD	33	9	12	9	9	15	9	9
KUS-16-40-SD	36	10	13	10	10	18	12	12
KUS-16-60-SD	39	11	14	11	11	21	15	15
KUS-16-80-SD	42	12	15	12	12	24	18	18
KUS-20-40-SD	41	14	18	14	14	22	18	18
KUS-20-80-SD	47	17	20	15	15	27	26	26
KUS-20-120-SD	53	20	22	16	16	32	34	34
KUS-20-160-SD	59	23	24	17	17	37	42	42
KUS-25-60-SD	61	29	36	26	26	50	44	44
KUS-25-120-SD	73	36	42	28	28	62	66	66
KUS-25-180-SD	85	43	48	30	30	74	88	88
KUS-25-240-SD	96	50	54	32	32	86	110	110

On installation of a projecting load (direction Lz) on the end plate, it is essential to provide additional fastening on the slide to prevent vibrations (see Setup information)!

2.8 Deformations

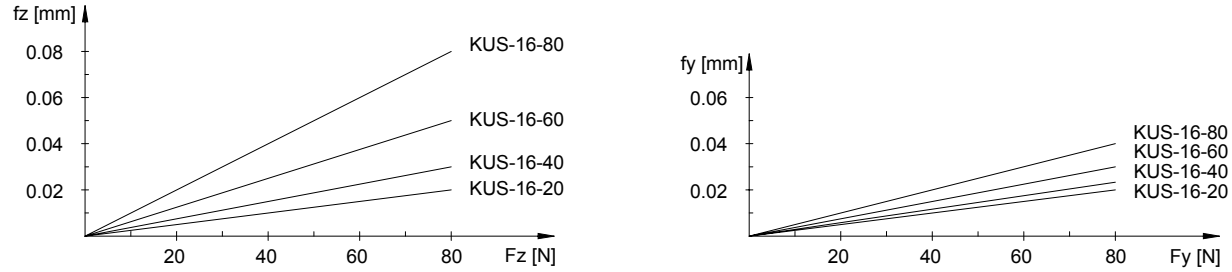
2.8.1 Definition of the deformations

Fig. 2.8-1: Definition of the deformations



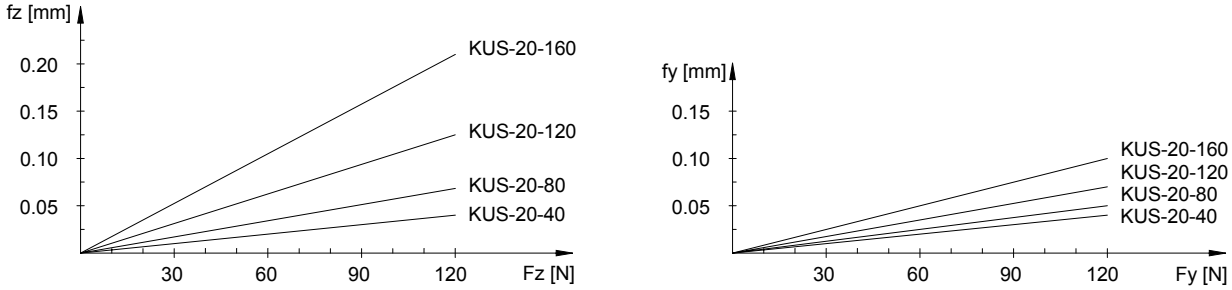
2.8.2 KUS-16

Fig. 2.8-2: Deformations for KUS-16



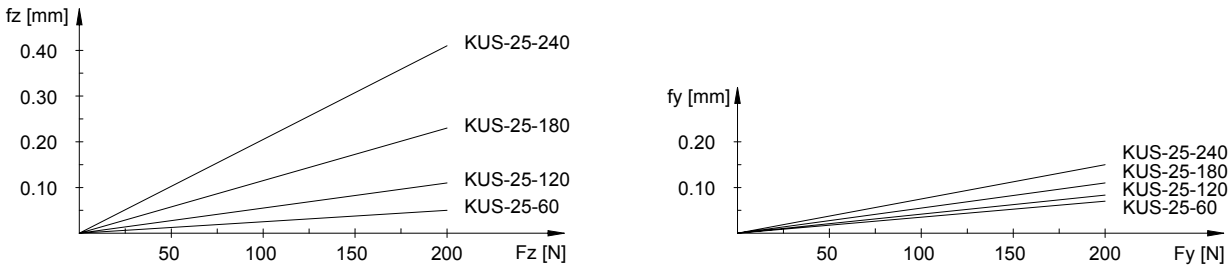
2.8.3 KUS-20

Fig. 2.8-3: Deformations for KUS-20



2.8.4 KUS-25

Fig. 2.8-4: Deformations for KUS-25



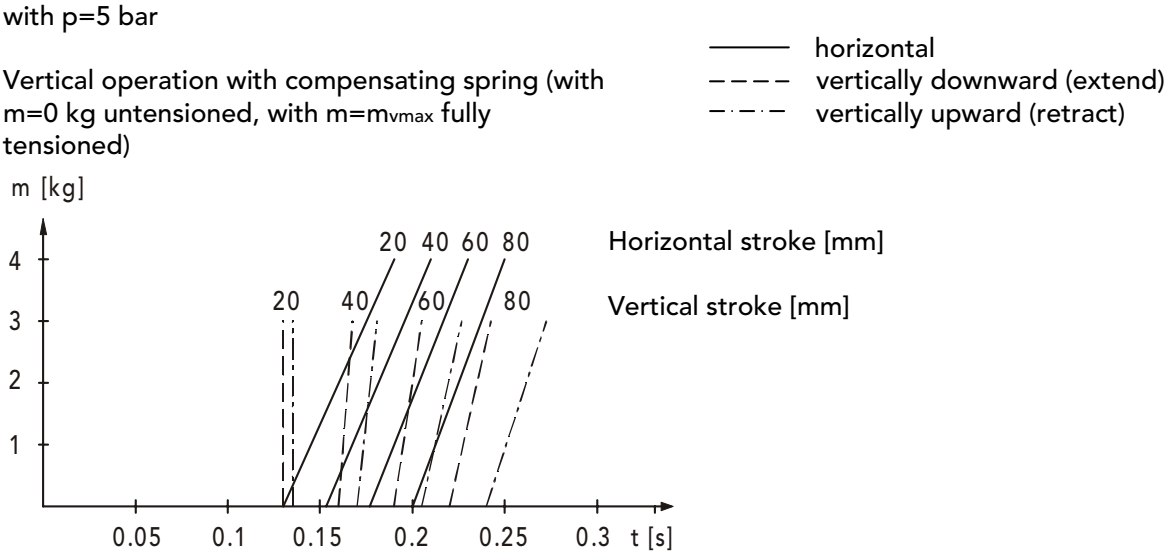
2.9 Travel times

2.9.1 KUS-16

Fig. 2.9-1: Travel times for KUS-16

with p=5 bar

Vertical operation with compensating spring (with m=0 kg untensioned, with m=m_{vmax} fully tensioned)

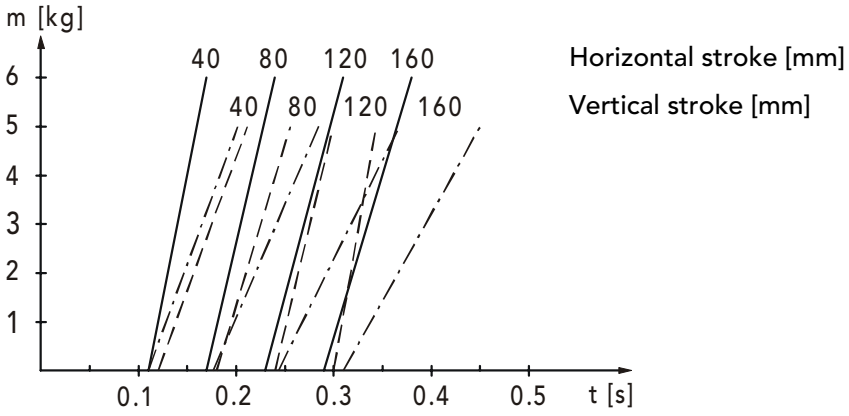


2.9.2 KUS-20

Fig. 2.9-2: Travel times for KUS-20

with p=5 bar

Vertical operation with compensating spring (with m=0 kg untensioned, with m=m_{vmax} fully tensioned)



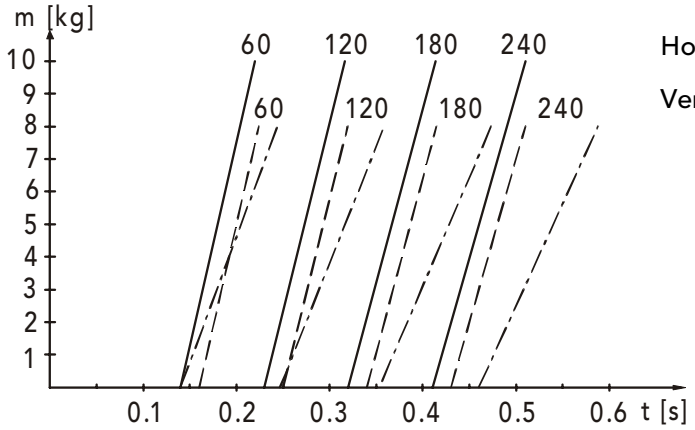
2.9.3 KUS-25

Fig. 2.9-3: Travel times for KUS-25

with p=5 bar

Vertical operation with compensating spring (with m=0 kg untensioned, with m=m_{vmax} fully tensioned)

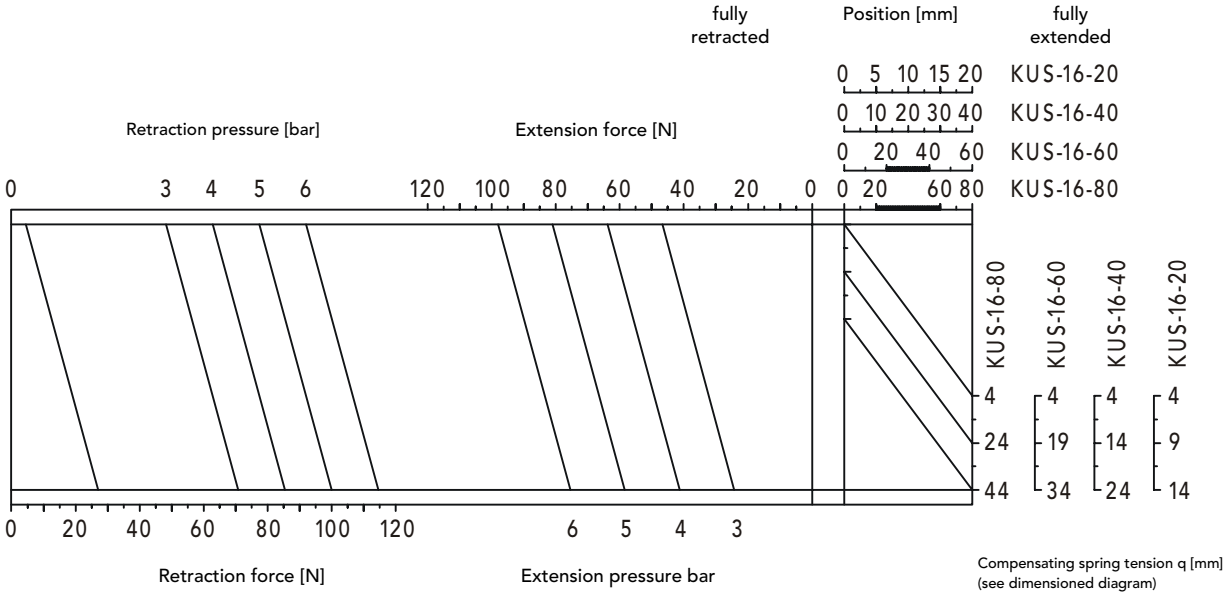
——— horizontal
– – – – vertically downward (extend)
– · – · – vertically upward (retract)



2.10 Force diagrams (KUS with compensating spring kit)

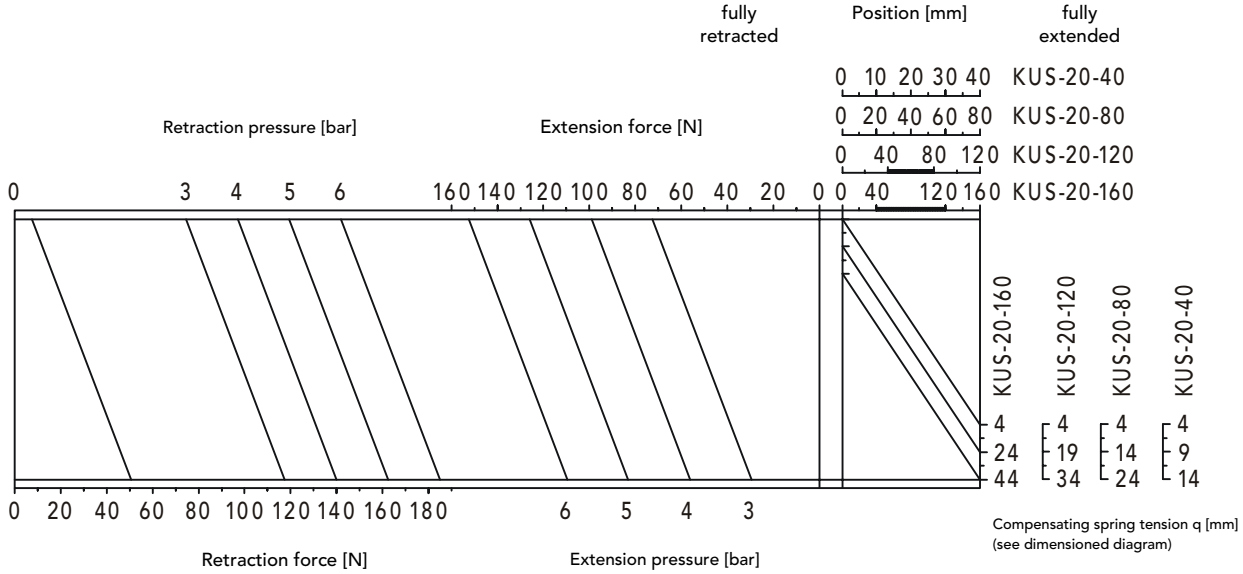
2.10.1 KUS-16

Fig. 2.10-1: Force diagrams for KUS-16



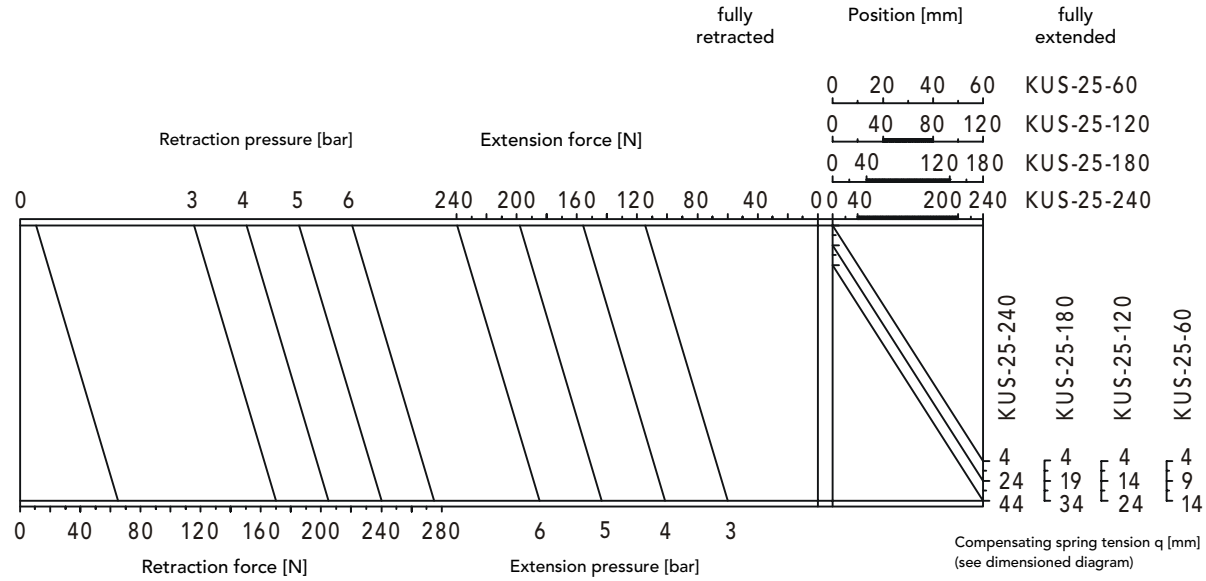
2.10.2 KUS-20

Fig. 2.10-2: Force diagrams for KUS-20



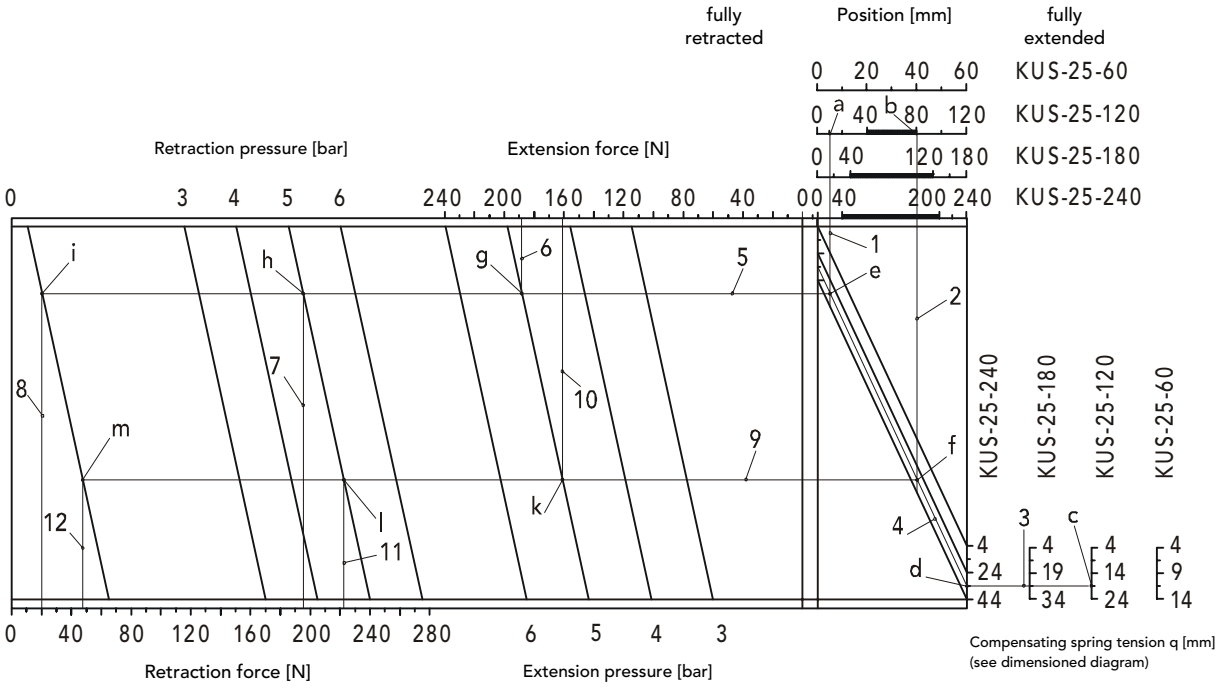
2.10.3 KUS-25

Fig. 2.10-3: Force diagrams for KUS-25



2.10.4 Example for force diagram

Fig. 2.10-4: Example for force diagram



Given:

- KUS-25-120 with compensating spring kit
- Stroke: 70 mm (vertical, extend downward)
- Pressure: 5 bar
- Mounting mass: 6 kg

Required:

- Retraction force in retracted state with compensating spring tension q = 19 mm
- Extension force in retracted state with compensating spring tension q = 19 mm
- Retraction force in extended state with compensating spring tension q = 19 mm
- Extension force in extended state with compensating spring tension q = 19 mm
- Retraction force in retracted state, without pressure, with compensating spring tension q = 19 mm
- Retraction force in extended state, without pressure, with compensating spring tension q = 19 mm

1. Determine positions for KUS-25-120 (point a and point b): for the 70 mm stroke, the extended position is reduced by 40 mm (= max. stop adjustment range per side), gives position 80 mm, and additionally the retracted position is reduced by 10 mm (120-40-70 = 10 mm). From points a and b, draw the lines 1 and 2 vertically downward.

2. Mark compensating spring tension q = 19 mm for KUS-25-120 (point c) and draw horizontal line 3 to edge of diagram (gives point d).

3. From point d, draw line 4 parallel to the predetermined lines. The point of intersection with line 1 gives point e and the point of intersection with line 2 give point f.

4. From point e, draw horizontal line 5 to the left. The point of intersection with extension pressure 5 bar gives point g, the point of intersection with retraction pressure 5 bar gives point h and the point of intersection with retraction pressure 0 bar gives point i.

5. From g, draw vertical line 6 upward, gives an **extension force in the retracted state** of 188 N. Adding the installation mass of 60 N to this gives **248 N**.

6. From point h, draw vertical line 7 downward, gives a **retraction force in the retracted state** of 194 N. Subtracting the installation mass of 60 N from this gives **134 N**.

7. From point i, draw vertical line 8 downward, gives a **retraction force at atmospheric pressure in the retracted state** of **20 N**, i.e. the installation mass of 60 N is **not** held in the upper end position on loss of pressure.

8. From point f, draw horizontal line 9 to the left. The point of intersection with extension pressure 5 bar gives point k, the point of intersection with retraction pressure 5 bar gives point l and the point of intersection with retraction pressure 0 bar gives point m.

9. From point k, draw vertical line 10 upward, gives an **extension force in the extended state** of 161 N. Adding the installation mass of 60 N to this gives **221 N**.

10. From point l, draw vertical line 11 downward, gives a **retraction force in the extended state** of 222 N. Subtracting the installation mass of 60 N from this gives **162 N**.

11. From point m, draw line 12 downward, gives a **retraction force at atmospheric pressure in the extended state** of **47 N**, i.e. the installation mass of 60 N is **not** retracted from the lower end position on loss of pressure!

3 Commissioning

3.1 Installation position and installation

Compact universal slides KUS can be installed in any position. As a rule, the housing (item 10) is fixed and the stroke is performed by the slide (item 20). In the case of vertical use, it is necessary to provide a compensating spring (see Special accessories), which ensures uniform movement and an optimum cycle time even with the maximum mounting mass.

The installation is performed by means of Quick-Set fixing elements (SLL-..-40) on the dovetail of the housing (item 10) or by means of the threaded holes and positioning holes on the housing (item 10). With installation by means of Quick-Set fixing elements, it is advisable to fix the housing (item 10) with **two** clamping elements SLL-..-40 (use of the dovetail length, i.e. fixing as far as possible at the ends of the housing).

Fig. 3.1-1: Installation position and installation

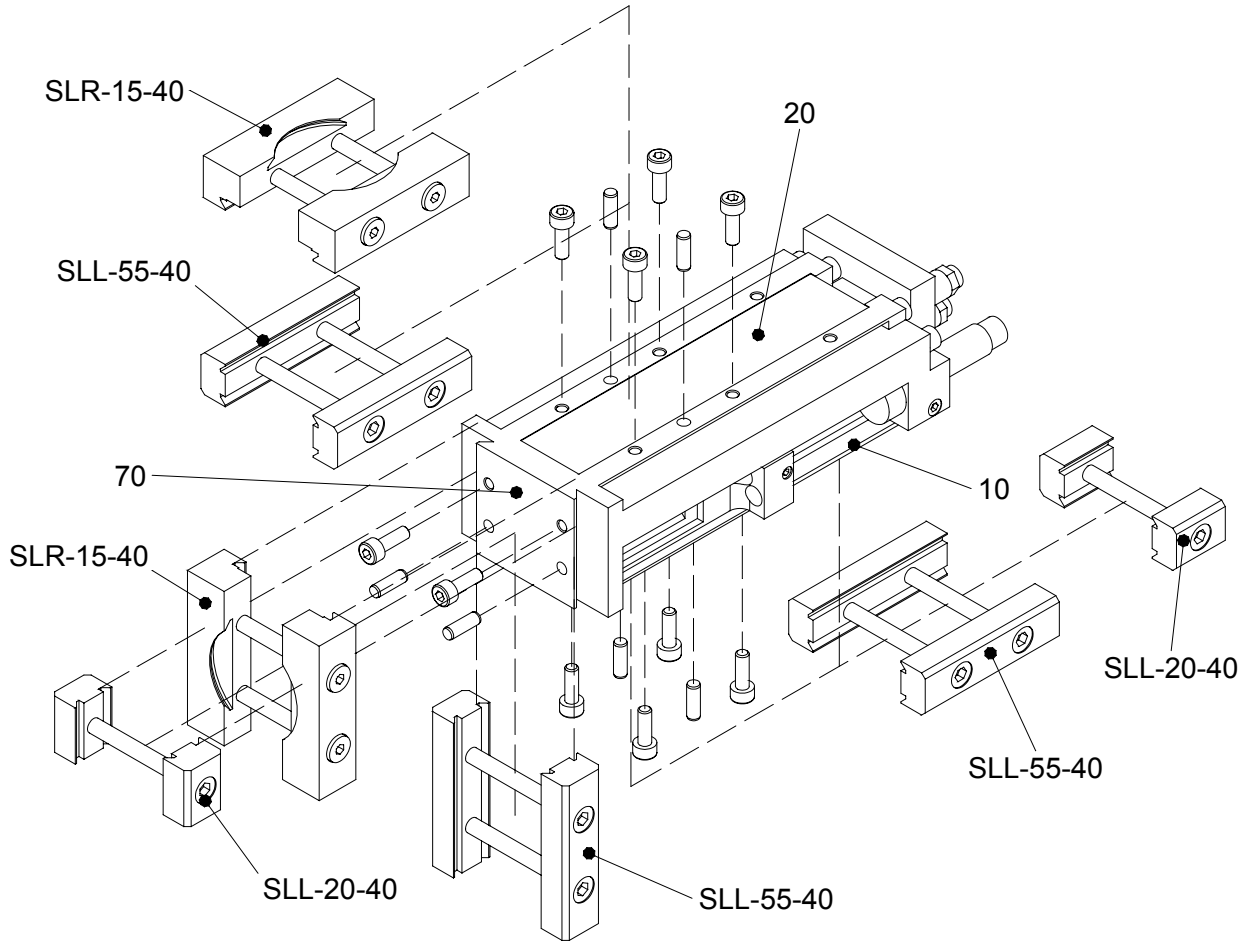
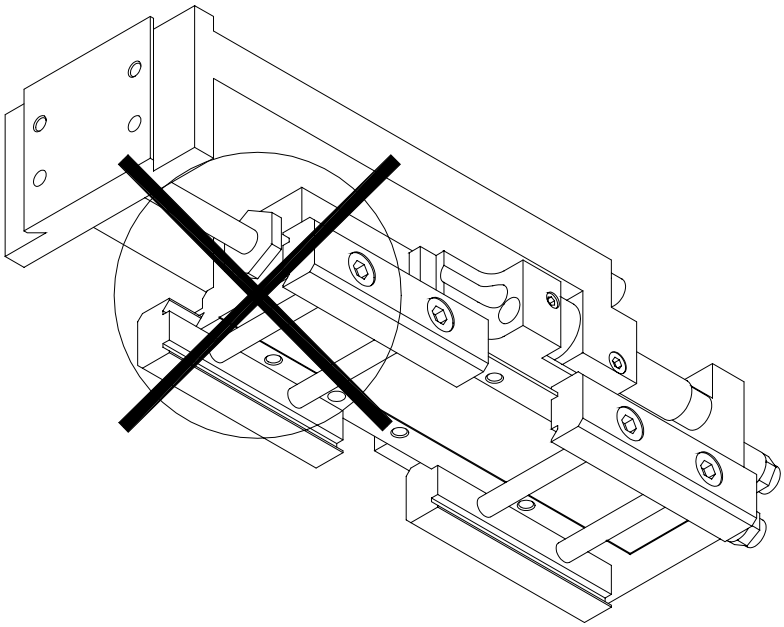


Fig. 3.1-2: Installation position and installation



With the use of Quick-Set fixing elements, it is essential to ensure that the fixing elements do not project beyond the edge of the housing at the front!

3.2 Installation of the add-on units (Fig. 3.1-1)

Provided that the permissible loads are complied with, any add-on units can be fixed to the KUS slide.

The add-on units are installed by means of Quick-Set fixing elements (SLL-..-40 or SLR-15-40) on the dovetail fitting mounted on the slide (item 20) or on the end plate (item 70) or by means of the threaded holes and positioning holes on slide (item 20) and end plate (item 70). Fixing on the end plate (item 70) **and** on the slide (item 20) always results in improved rigidity and a reduction in the vibrations! (Also see section "Setup information").

When fixing add-on units, the static load limits of the KUS slides must be observed with respect to the tightening torques!

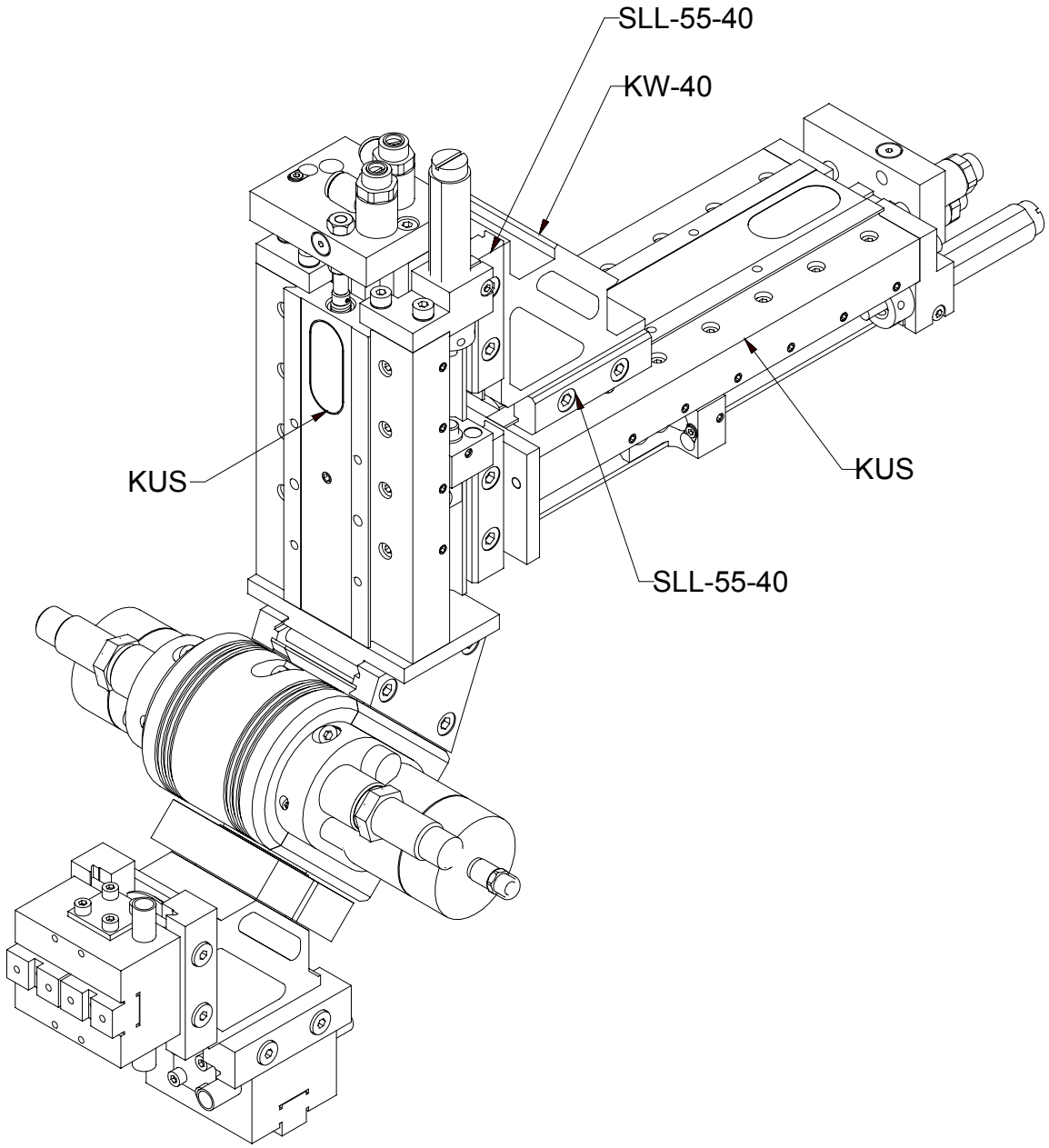
3.3 Setup information

On installing a projecting load (direction Lz) on the end plate, it is essential to provide additional fixing on the slide in order to prevent vibrations! By using Quick-Set elements, such fixing can be realized easily and quickly.

E.g. feeder with revolver head:

A bracket KW-40 with two clamping elements SLL-55-40 is used for additional fixing for the vertical KUS.

Fig. 3.3-1: Mounting example (feeder with revolver head)



3.4 Installation of the compensating spring

- Remove fillister head screw (item 440) from the housing cover (item 60).
- Remove retractable spring pin (item 210) from the slide (item 20).
- Remove hexagon nut (item EAF/30) from the compensating spring kit. In KUS-16 and KUS-20, screw back the second hexagon nut (item EAF/30) until the compensating spring can be pushed into the carriage (item 20) up to the hole for the retractable spring pin (item 210).
- Extend slide and insert compensating spring kit into the hole on the slide (item 20) **(note position of clamping bolt (item EAF/20)! Fig. 3.4-2)** until the hole in the tab (item EAF/10) of the compensating spring coincides with the hole for the retractable spring pin (item 210) in the slide (item 20), and screw in retractable spring pin (item 210).
- Retract slide, passing the clamping bolt (item EAF/20) through the hole in the housing cover (item 60) and fixing it with the hexagon nut (item EAF/30) which has been removed.
- Screw in fillister head screw (item 440; if necessary, turn the clamping bolt (item EAF/20) so that the bevel is parallel to the hole axis for the fillister head screw (item 440).
- By turning the outer hexagon nut (item EAF/30), generate the desired spring tension, and lock with the inner hexagon nut (item EAF/30).

Fig. 3.4-1: Installation of compensating spring 1

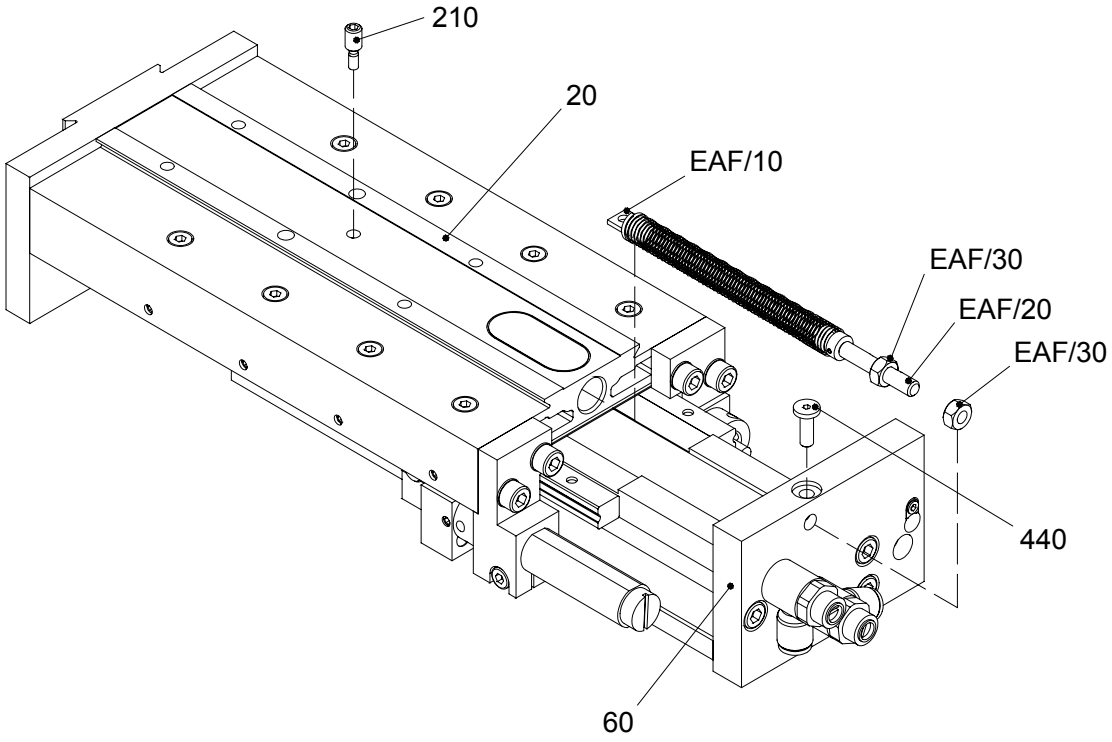
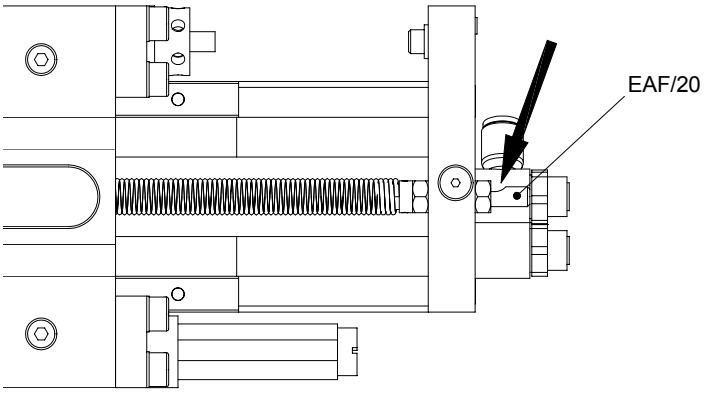


Fig. 3.4-2: Installation of compensating spring 2



3.5 Pneumatic connection

The adjustable exhaust throttles (item 500) have pluggable air connections, and the respective hose diameters are shown in the technical data.

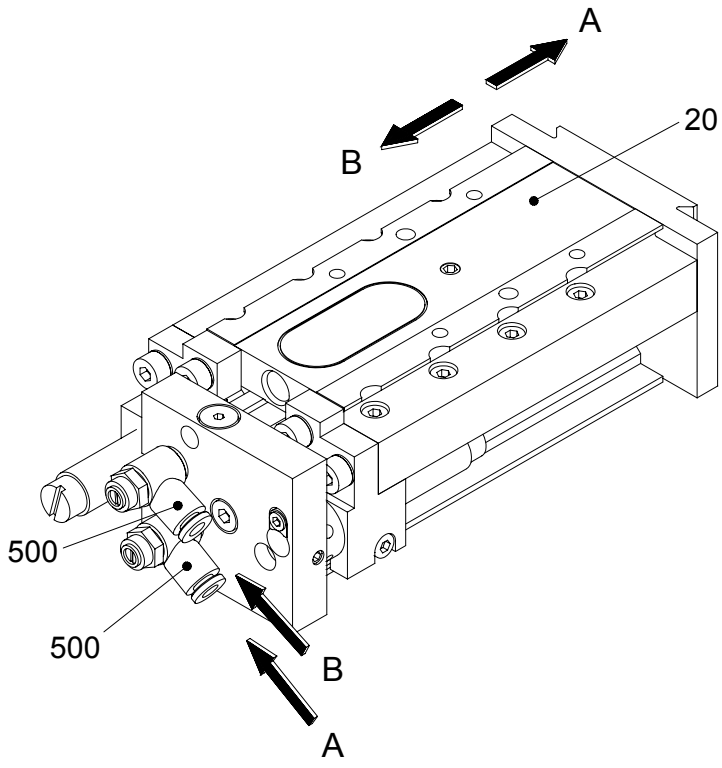
Extend slide:

The slide (item 20) is extended via the connection "A".

Retract slide:

The slide (item 20) is retracted via the connection "B".

Fig. 3.5-1: Pneumatic connection



3.6 Adjustment of the stops

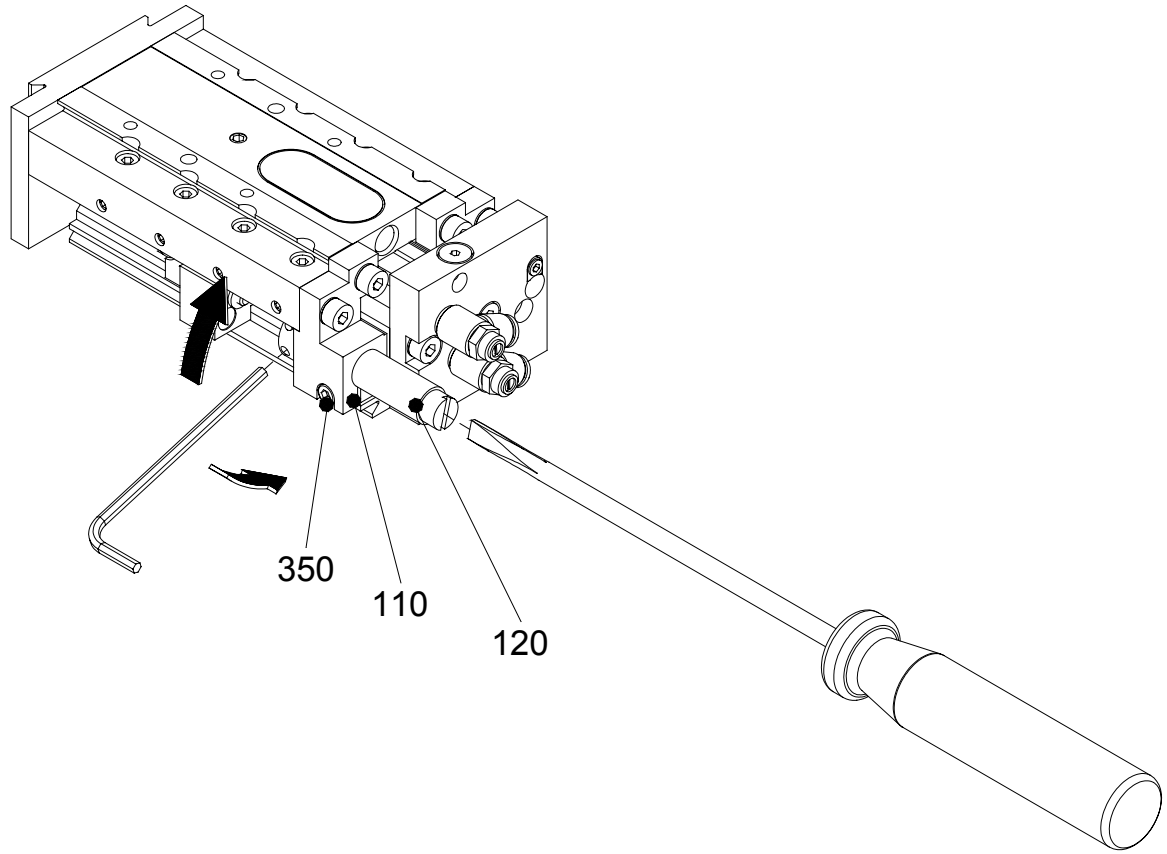
Procedure:

- Loosen fillister head screw (item 350).
- Screw in or unscrew shock absorber (item 120) using a screwdriver or using a hexagon socket wrench.
- Tighten fillister head screw (item 350).

The maximum adjustment of the shock absorbers is achieved when the thread end of the shock absorber (item 120) is flush with the edge of the shock absorber bolder (item 110)!
Keep hands and tools out of the way during travel!

The two end stops are continuously adjustable by 20 or 40 mm, depending on size (see Technical Data). As far as possible, the stroke should be limited only at one end since, with stroke limitation at both ends, the ball cage (item 30/20; Fig. 6-1) may move to an extreme position, depending on the load. If the stroke is subsequently increased, this can lead to projection of the ball cage (item 30/20; Fig. 6-1) with the result that the slide no longer travels to its end position (ball cage has to be repositioned)!

Fig. 3.6-1: Adjustment of the stops



3.7 Adjustment of the shock absorbers

The travelling speed, the mounting mass and the operating pressure influence the energy to be absorbed by the shock absorbers. The optimum adjustment, i.e. that which gives the shortest travel time with given influencing variables, is achieved by matching exhaust air throttling and shock absorber setting.

Keep hands and tools out of the way during travel!

- Set up KUS in desired position (with vertical use, install compensating spring, see "Installation of the compensating spring").
- Mount add-on units.
- Close exhaust throttles (item 500) about 4 to 5 turns.
- Set end position damping to maximum damping (basic setting): loosen threaded pin (item 390) about a quarter turn so that the damping screw (item 150) can be turned but the clamping sleeve (item 140) is still held, and screw in damping screw (item 150) fully. Tighten threaded pin (item 390).
- The optimum settings are obtained if the slide with the installed load travels to the end position without causing an impact or without any visible retardation. If an impact occurs at the end position with the existing settings, the corresponding exhaust throttle (item 500) must be further closed. If the slide travels to the end position with a visible retardation, the exhaust throttle (item 500) can be opened slightly and/or the damping screw (item 150) can be unscrewed slightly.
  Important: When tightening the threaded pin (item 390), ensure that the collar of the clamping sleeve (item 140) rests against the front stop (item 130) or against the housing (item 60). The minimum damping is obtained when the damping screw (item 150) is flush with the clamping sleeve (item 140) (Fig. 3.7-2).

Travel to the end positions with impacts has an adverse effect on the life of the KUS!
By setting the maximum travel time permissible in the process, the KUS slide is protected and the service life is increased.

Fig. 3.7-1: Adjustment of shock absorber 1

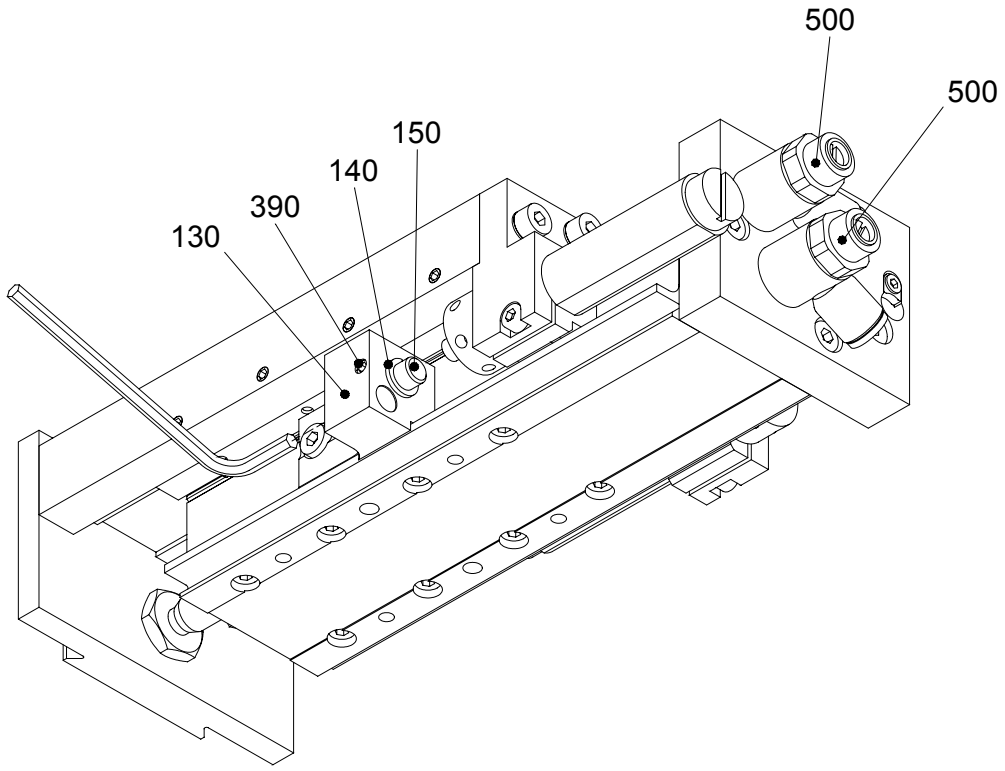
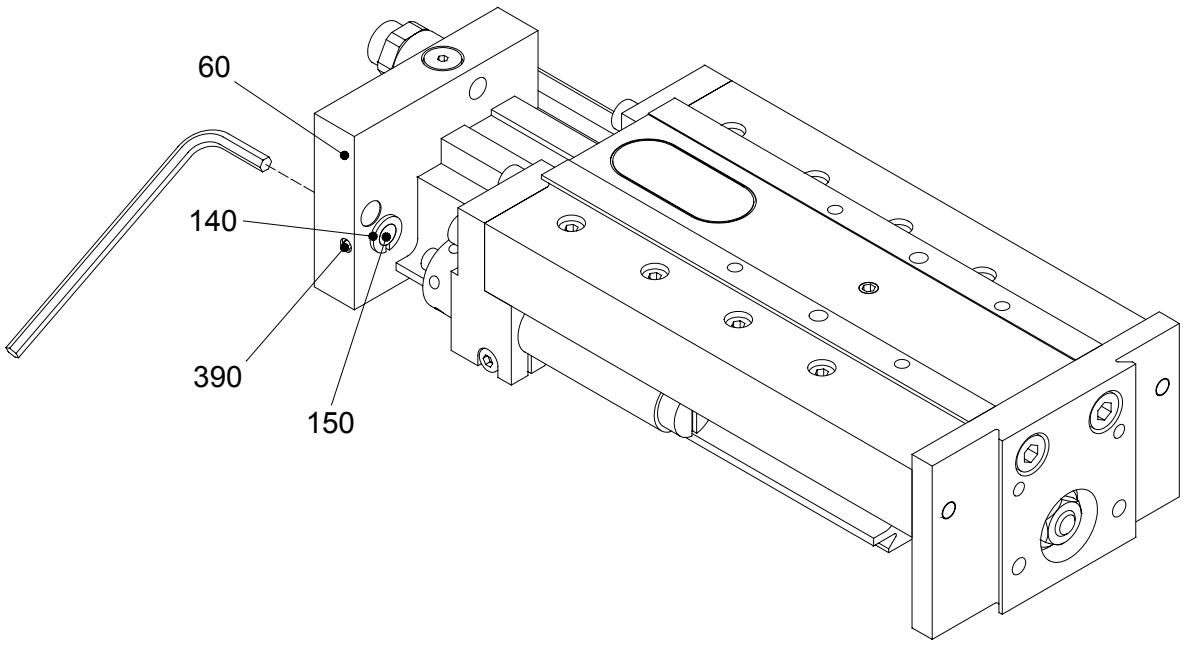


Fig. 3.7-2: Adjustment of shock absorber 2



3.8 Installation and connection of the inductive proximity switches

The inductive proximity switches to be installed must fulfil the following conditions:

- Sensing distance: 2 mm
- Capable of being installed flush
- Housing diameter: 6.5 mm
- Minimum housing length (Ø 6.5): 15 mm

The proximity switches are installed by pushing into the corresponding hole in the housing cover (item 60) or in the front stop (item 130) up to the bottom of the hole. They are fixed by tightening the clamping screw (item 190).

Connecting cable to pluggable proximity switches:

With the use of pluggable proximity switches, it is essential to use connecting cables with angled socket, owing to the limited space available at the front position scan.
To ensure that forces can never act on the proximity switches, the connecting cables should **always be provided with tension relief devices**!

Fig. 3.8-1: Installation of inductive proximity switch 1

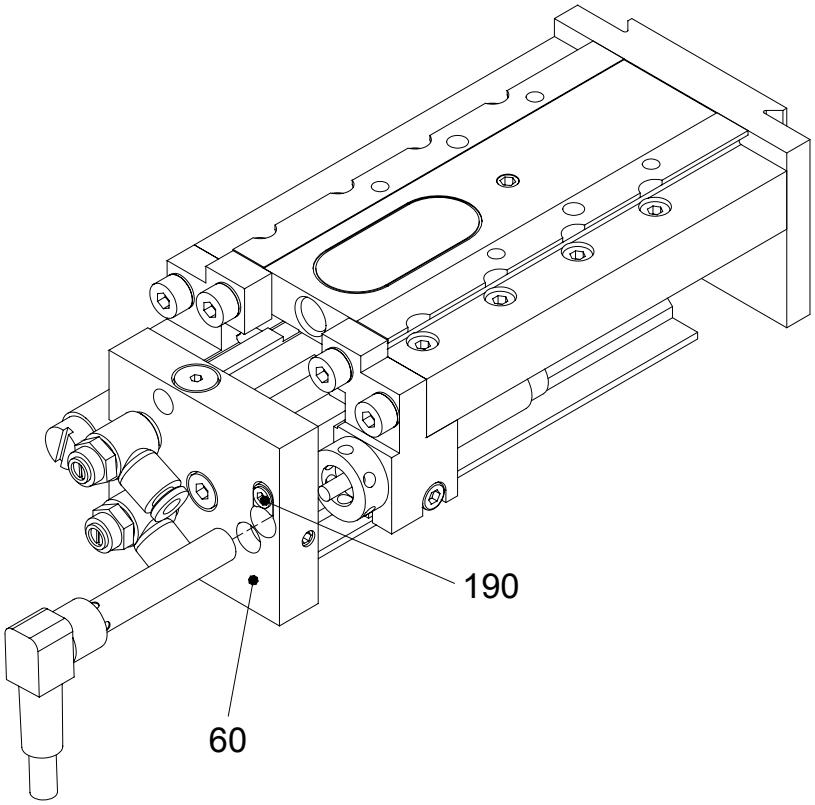
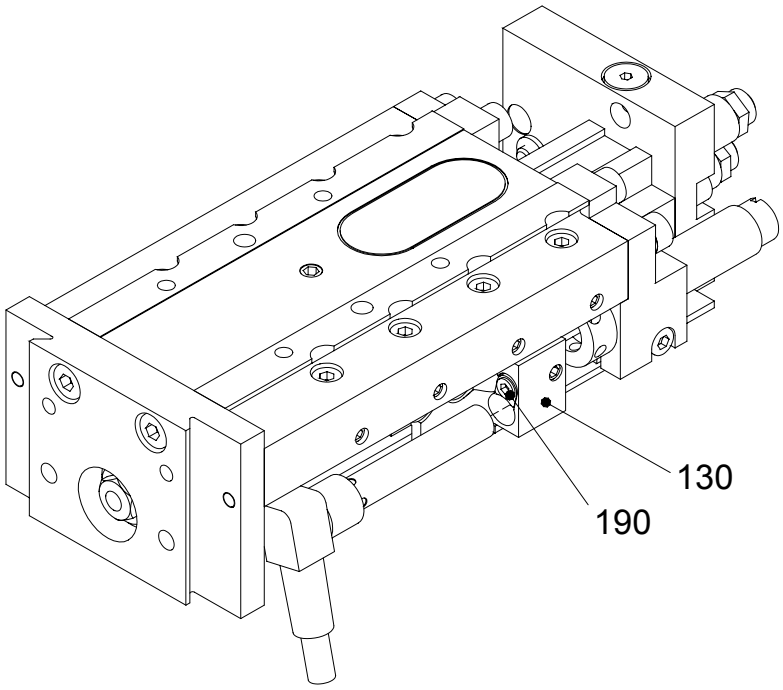
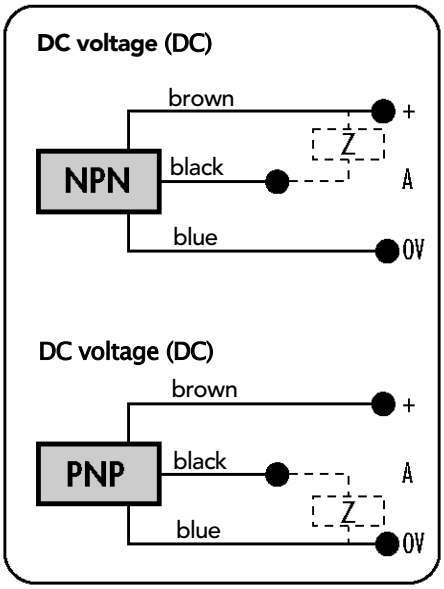


Fig. 3.8-2: Installation of inductive proximity switch 2



The electrical connection is made according to the following diagram:

Fig. 3.8-3: Connection of the inductive proximity switch



4 Maintenance

4.1 Lubrication

Exclusively **Klüber oil "Paraliq P460"** (Montech Art No. 504721) may be used as a lubricant.

- Lubrication interval: 800 operating hours
- Lubricating points: Apply lubricant to 4 positions "C" directly on the guide track on the guide rails (item 30/10) and distribute by retracting and extending the slide several times (repeat procedure 2-3 times). In the case of short strokes, it is advisable also to allow a little lubricant to flow between the guide rails (item 30/10) on both sides in the middle of the cage (item 30/20). (Fig. 4.1-2).

Clean guide rails prior to lubrication!

Fig. 4.1-1: Lubrication 1

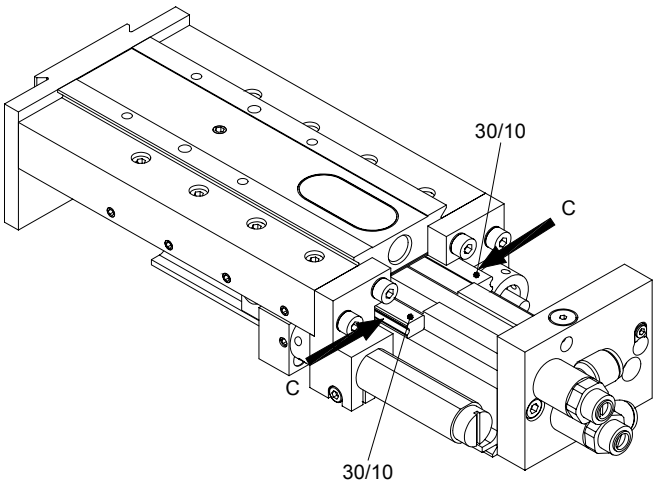
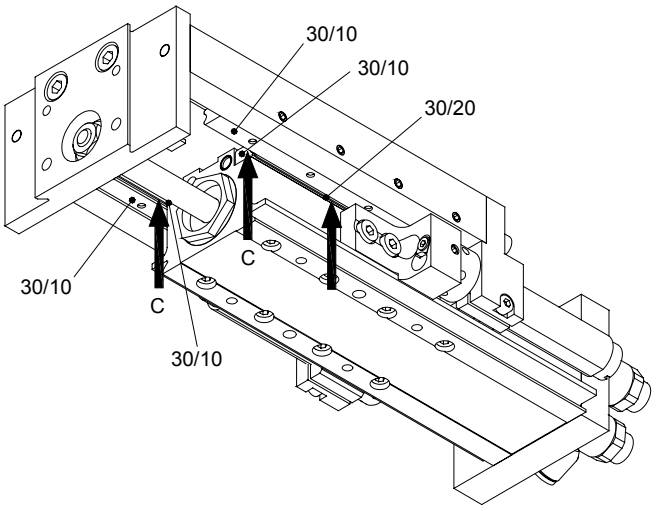


Fig. 4.1-2: Lubrication 2



5 Repairs

5.1 Replacement of the shock absorbers

- Loosen fillister head screws (item 340) on **one** shock absorber holder (item 110). **Important: On simultaneous removal of both shock absorber holders, the extension stroke will no longer be limited! In the event of excessive extension, individual balls fall out of the guide!**
- Remove shock absorber holder (item 110).
- Loosen fillister head screw (item 350) in the shock absorber holder (item 110) removed and replace shock absorber (item 120) (note direction of screwing in!).
- Mount shock absorber holder (item 110) on slide (item 20), positioning the shock absorber holder (item 110) by tapping on the surface "A" on the slide (item 20), and screw tight.
- Repeat procedure for replacing the second shock absorber.

Fig. 5.1-1: Replacement of shock absorber 1

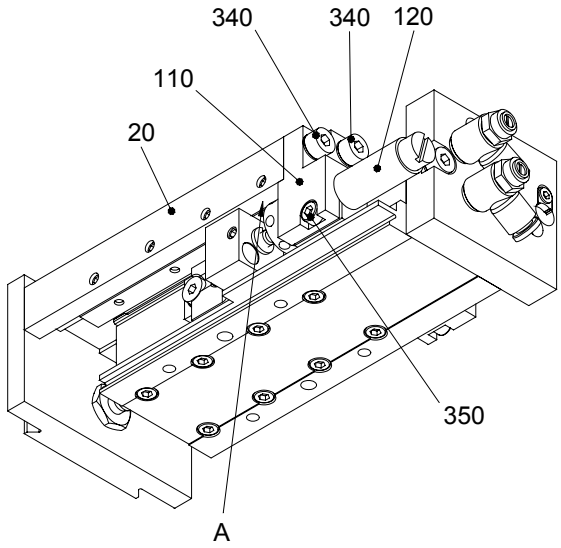
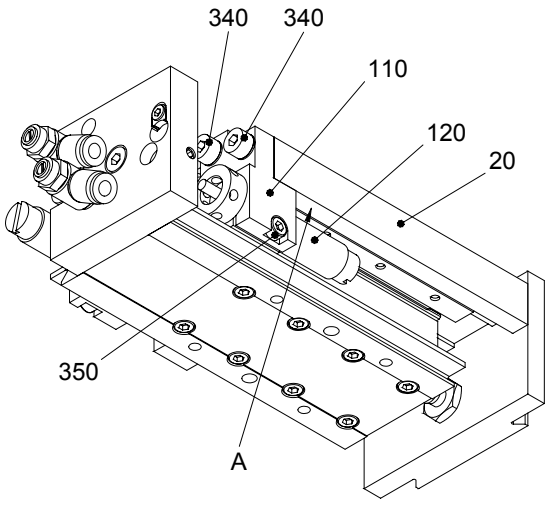
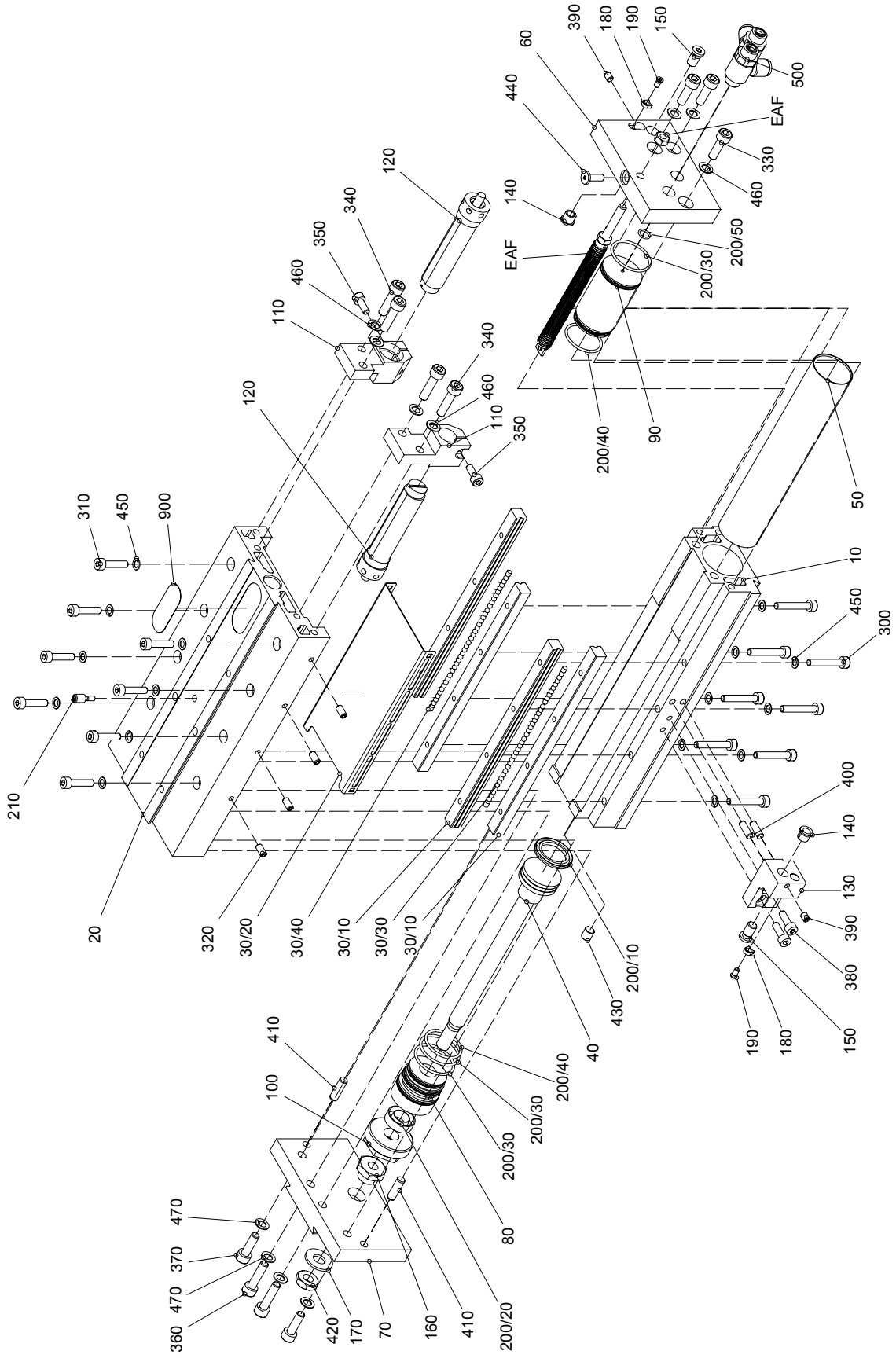


Fig. 5.1-2: Replacement of shock absorber 2



6 Spare parts lists

Fig. 6-1: Exploded drawing



6.1 KUS-16

No.	Designation	Item No.				Material
	KUS-16	**-20-SD**	**-40-SD**	**-60-SD**	**-80-SD**	
10	Housing	51426	51427	51428	51429	Aluminum
20	Slide	51453	51454	51455	51456	Aluminum
30*	Guide complete	51577	51578	51579	51580	
30/10*	Guide rail	51364	51365	51366	51367	Steel
30/20*	Ball cage	51376	51377	51378	51379	Steel
30/30*	Ball	508414	508414	508414	508414	Steel
30/40*	Felt wick	51576	51576	51576	51576	Wool felt
40	Piston rod with piston	51536	51537	51538	51539	Steel/Bronze
50	Cylinder tube	51465	51466	51467	51468	Steel
60	Housing cover	51405	51405	51405	51405	Aluminum
70	End plate	51441	51441	51441	51441	Aluminum
80	Sealing bush front	51388	51388	51388	51388	Bronze
90	Sealing bush rear	51391	51391	51391	51391	Aluminum
100	Cylinder cover	51408	51408	51408	51408	Steel
110	Shock absorber holder	51397	51397	51397	51397	Aluminum
120*	Shock absorber with stop nut	51533	51533	51533	51533	Steel/Various
130	Stop front	51394	51394	51394	51394	Aluminum
140	Clamping sleeve	51403	51403	51403	51403	Steel
150	Damping screw	51444	51444	51444	51444	Steel
160	Piston rod nut	51438	51438	51438	51438	Steel
170	Washer	51517	51517	51517	51517	Steel
180	Clamping piece	47906	47906	47906	47906	Steel
190	Clamping screw	47904	47904	47904	47904	Steel
200*	Sealing set	508423	508423	508423	508423	
200/10*	Piston packing	504971	504971	504971	504971	NBR
200/20*	Grooved ring	506102	506102	506102	506102	PUR
200/30*	O-ring	505987	505987	505987	505987	NBR
200/40*	O-ring	501233	501233	501233	501233	NBR
200/50*	O-ring	503101	503101	503101	503101	NBR
210	Retraction spring pin	51446	51446	51446	51446	Steel
300	Fillister head screw M3x25	508119	508119	508119	508119	Steel

310	Fillister head screw M3x8	508470	508470	508470	508470	Steel
320	Threaded pin M4x5	502640	502640	502640	502640	Steel
330	Fillister head screw M4x14	508472	508472	508472	508472	Steel
340	See No. 330					
350	See No. 310					
360	Fillister head screw M4x12	502506	502506	502506	502506	Steel
370	-					
380	Fillister head screw M4x8	502522	502522	502522	502522	Steel
390	See No. 320					
400	Straight pin ø2.5h6x8	506443	506443	506443	506443	Steel
410	Straight pin ø3h6x10	502020	502020	502020	502020	Steel
420	Hexagon nut M5 x 0.6d	505266	505266	505266	505266	Steel
430	Expander	502698	502698	502698	502698	Steel
440	Fillister head screw M4x12	508412	508412	508412	508412	Steel
450	Ribbed washer M3	505385	505385	505385	505385	Steel
460	Ribbed washer M4	502606	502606	502606	502606	Steel
470	See No. 460					
500	Exhaust throttle M5 ø4	505023	505023	505023	505023	Various
900	Type plate	41620	41620	41620	41620	Polyester
EAF	Compensating spring kit	51631	51632	51633	51634	Steel
* The marked items are wearing parts and are available from stock.						

6.2 KUS-20

No.	Designation	Item No.				Material
	KUS-20	**-40-SD**	**-80-SD**	**-120-SD**	**-160-SD**	
10	Housing	51430	51431	51432	51433	Aluminum
20	Slide	51457	51458	51459	51460	Aluminum
30*	Guide complete	51581	51582	51583	51584	
30/10*	Guide rail	51368	51369	51370	51371	Steel
30/20*	Ball cage	51380	51381	51382	51383	Steel
30/30*	Ball	508414	508414	508414	508414	Steel
30/40*	Felt wick	51576	51576	51576	51576	Wool felt
40	Piston rod with piston	51552	51553	51554	51555	Steel/Bronze
50	Cylinder tube	51469	51470	51471	51472	Steel
60	Housing cover	51406	51406	51406	51406	Aluminum
70	End plate	51442	51442	51442	51442	Aluminum
80	Sealing bush front	51389	51389	51389	51389	Bronze
90	Sealing bush rear	51392	51392	51392	51392	Aluminum
100	Cylinder cover	51409	51409	51409	51409	Steel
110	Shock absorber holder	51398	51398	51398	51398	Aluminum
120*	Shock absorber with stop nut	51534	51534	51534	51534	Steel/Various
130	Stop front	51395	51395	51395	51395	Aluminum
140	Clamping sleeve	51404	51404	51404	51404	Steel
150	Damping screw	51445	51445	51445	51445	Steel
160	Piston rod nut	51439	51439	51439	51439	Steel
170	Washer	51518	51518	51518	51518	Steel
180	Clamping piece	47906	47906	47906	47906	Steel
190	Clamping screw	47904	47904	47904	47904	Steel
200*	Sealing set	508424	508424	508424	508424	
200/10*	Piston packing	504972	504972	504972	504972	NBR
200/20*	Grooved ring	506103	506103	506103	506103	PUR
200/30*	O-ring	505988	505988	505988	505988	NBR
200/40*	O-ring	505574	505574	505574	505574	NBR
200/50*	O-ring	503101	503101	503101	503101	NBR
210	Retraction spring pin	51447	51447	51447	51447	Steel
300	Fillister head screw M3x25	508119	508119	508119	508119	Steel

310	Fillister head screw M3x12	502504	502504	502504	502504	Steel
320	Theaded pin M4x10	508416	508416	508416	508416	Steel
330	Fillister head screw M4x16	502509	502509	502509	502509	Steel
340	See No. 330					
350	Fillister head screw M3x8	508470	508470	508470	508470	Steel
360	Fillister head screw M5x14	502513	502513	502513	502513	Steel
370	-					
380	Fillister head screw M4x10	508471	508471	508471	508471	Steel
390	Threaded pin M4x5	502640	502640	502640	502640	Steel
400	Straight pin ø4h6x12	502035	502035	502035	502035	Steel
410	See No. 400					
420	Hexagon nut M6 x0.5d	508415	508415	508415	508415	Steel
430	Expander	506001	506001	506001	506001	Steel
440	Fillister head screw M4x12	508412	508412	508412	508412	Steel
450	Ribbed washer M3	505385	505385	505385	505385	Steel
460	Ribbed washer M4	502606	502606	502606	502606	Steel
470	Ribbed washer M5	505254	505254	505254	505254	Steel
500	Exhaust throttle 1/8" ø6	505016	505016	505016	505016	Various
900	Type plate	41620	41620	41620	41620	Polyester
EAF	Compensating spring kit	51635	51636	51637	51638	Steel
* The marked items are wearing parts and are available from stock.						

6.3 KUS-25

No.	Designation	Item No.				Material
	KUS-25	**-60-SD**	**-120-SD**	**-180-SD**	**-240-SD**	
10	Housing	51434	51435	51436	51437	Aluminum
20	Slide	51461	51462	51463	51464	Aluminum
30*	Guide complete	51585	51586	51587	51588	
30/10*	Guide rail	51372	51373	51374	51375	Steel
30/20*	Ball cage	51384	51385	51386	51387	Steel
30/30*	Ball	508414	508414	508414	508414	Steel
30/40*	Felt wick	51576	51576	51576	51576	Wool felt
40	Piston rod with piston	51556	51557	51558	51559	Steel/Bronze
50	Cylinder tube	51473	51474	51475	51476	Steel
60	Housing cover	51407	51407	51407	51407	Aluminum
70	End plate	51443	51443	51443	51443	Aluminum
80	Sealing bush front	51390	51390	51390	51390	Bronze
90	Sealing bush rear	51393	51393	51393	51393	Aluminum
100	Cylinder cover	51410	51410	51410	51410	Steel
110	Shock absorber holder	51399	51399	51399	51399	Aluminum
120*	Shock absorber with stop nut	51535	51535	51535	51535	Steel/Various
130	Stop front	51396	51396	51396	51396	Aluminum
140	Clamping sleeve	51404	51404	51404	51404	Steel
150	Damping screw	51445	51445	51445	51445	Steel
160	Piston rod nut	51440	51440	51440	51440	Steel
170	Washer	51519	51519	51519	51519	Steel
180	Clamping piece	47906	47906	47906	47906	Steel
190	Clamping screw	47904	47904	47904	47904	Steel
200*	Sealing set	508425	508425	508425	508425	
200/10*	Piston packing	504973	504973	504973	504973	NBR
200/20*	Grooved ring	508419	508419	508419	508419	PUR
200/30*	O-ring	508418	508418	508418	508418	NBR
200/40*	O-ring	503114	503114	503114	503114	NBR
200/50*	O-ring	506130	506130	506130	506130	NBR
210	Retraction spring pin	51448	51448	51448	51448	Steel
300	Fillister head screw M4x25	508083	508083	508083	508083	Steel

310	Fillister head screw M4x18	508473	508473	508473	508473	Steel
320	Threaded pin M4x8	508417	508417	508417	508417	Steel
330	Fillister head screw M5x16	502512	502512	502512	502512	Steel
340	Fillister head screw M5x20	502515	502515	502515	502515	Steel
350	Fillister head screw M4x10	508471	508471	508471	508471	Steel
360	See No. 340					
370	See No. 330					
380	Fillister head screw M4x12	502506	502506	502506	502506	Steel
390	Threaded pin M4x5	502640	502640	502640	502640	Steel
400	Straight pin ø4h6x12	502035	502035	502035	502035	Steel
410	Straight pin ø5h6x16	502048	502048	502048	502048	Steel
420	Hexagon nut M8 x0.5d	505253	505253	505253	505253	Steel
430	Expander	508068	508068	508068	508068	Steel
440	Fillister head screw M4x12	508412	508412	508412	508412	Steel
450	Ribbed washer M4	502606	502606	502606	502606	Steel
460	Ribbed washer M5	505254	505254	505254	505254	Steel
470	See No. 460					
500	Exhaust throttle 1/8" ø6	505016	505016	505016	505016	Various
900	Type plate	41620	41620	41620	41620	Polyester
EAF	Compensating spring kit	51639	51640	51641	51642	Steel

* The marked items are wearing parts and are available from stock.

7 General information

7.1 Environmental compatibility and disposal

Materials used

- Aluminum
- Steel
- Bronze
- Wool fiber
- PUR (Polyurethane)
- NBR (Acrylonitrile-butadiene rubber)
- Polyester

Surface refinement

- Anodic oxidation of aluminum
- Nickel-plating of steel

Forming processes

- Profile extrusion of aluminum
- Material-removing processing of metals
- Injection molding of PUR seals
- Compression molding of NBR seals

Emissions during operation

- None

During operation of the equipment with oiled air, it is advisable to return the exhaust air into the atmosphere via an oil separator/oil filter.

Disposal

Compact universal slides (KUS) that are no longer in use are to be dismantled and recycled according to the type of material. The type of material for each part is stated in the spare parts lists. Any non-recyclable material is to be disposed of properly according to the materials.

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